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**Subject:** Literature Review Procedure Response to Comments  
**Date:** Tuesday, December 10, 2013 4:57:22 PM  
**Attachments:** [Procedure Conceptual Model for Lit Review draft 12-05-2013.docx](#)  
[Procedure Response to Comments 12-05-2013.docx](#)

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TWG Members/State Agency Partners,

Attached is the response to comments for the comments that I received about the MidCoast Sediment TMDLs Literature Review Procedure and Conceptual Model. I apologize for their being later than originally promised. Also attached is the revised version of the Procedure and Conceptual Models. I will be using this as the guiding document as I move forward on the literature review. The next step is for me to write up inclusion criteria and search terms for the review sections. I anticipate sending these to you in January. I will send these to you once they are completed at which time I will give a deadline for comments to be returned.

Thanks,

Josh

Joshua Seeds

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## **Mid-Coast Basin Sediment Technical Working Group Draft Literature Review Procedure & Conceptual Models:**

Oregon Department of Environmental Quality  
Water Quality Program

Contacts: Josh Seeds      503-229-5081  
David Waltz      541-687-7345

### Goals

This literature review is part of the Source Assessment and Linkage Analysis for the Mid-Coast Basin Sediment TMDLs, which are currently in development. This review's purpose is to answer scientific questions about sources of sediment and how those sources relate to identified impairments in the Mid-Coast Basin, and to identify areas where additional information/data are needed to fill knowledge gaps. The goals for this review are:

1. Provide a general understanding of sediment regimes (structures and processes) occurring in the Mid-Coast, with an emphasis on sediment and material source pathways, effects and processes within stream channels, hydrology, anthropogenic effects, and scientific uncertainties.
2. Using currently available scientific literature, investigate the linkages between sediment sources and water quality and beneficial uses, including anthropogenic effects and uncertainties.

### Objectives

The objectives for this review are:

- A. Characterize natural (unmodified by human activities) sediment regimes using available scientific information;
- B. Identify and evaluate possible anthropogenic sources of fine sediment to aquatic systems and alterations to native sediment regimes, incorporating processes, pathways, and temporal- and spatial-scaling factors;
- C. Link sediment regime structures and processes to water quality parameters (e.g. turbidity, total suspended solids, bedded fine sediment) and beneficial uses (e.g. aquatic macroinvertebrates, fisheries, and treatable drinking water sources).

### Questions for Each Topic

Two questions will be addressed for each of the literature review topics:

1. What are the natural (unmodified by human activity) characteristics and contributions of each source/process to sediment regimes and beneficial use support in stream systems?
2. How do anthropogenic activities alter natural sediment regimes and create sources of fine sediment to stream systems, and do those alterations have detrimental effects on beneficial uses?

### Literature Review Topics by Source/Process

#### Hillslope (Upland) Source Pathways:

- Deep-Seated Landslides/Earthflows
- Surface Erosion & Soil Creep
- Shallow Landslides
- Roads

#### Channel Sources & Processes:

- Riparian Areas
- In-Channel Storage, Stream Morphology, & Habitat
- Hydrology/Flow

### Outline of Sediment Literature Review Procedure:

1. TWG members and state agencies review and comment on conceptual diagrams in Figures 1-2e and sediment source pathways and channel processes identified as literature review topics. (Figures 3-6 show alternate ways of looking at sediment regimes. Figure 5 is the diagram adapted to create Figures 1-2e.)

#### **TWG/State Agency role:** Provide review and comment, answering the following questions:

- 1) Is Figure 1 understandable to you as a representation of the major categories of sediment source pathways and processes in a typical watershed? If not, how could it be clarified?
  - 2) Are there additional hillslope source pathways or processes to those shown in Figures 2a-d? If so, what are they and how do they fit into the conceptual model?
  - 3) Are there additional riparian & channel pathways or processes to those shown in Figure 2e? If so, what are they and how do they fit into the conceptual model?
  - 4) What are particular parts of the sediment regime (pathways or processes) that you suggest the literature review include? Are these addressed by the conceptual models and/or the watershed characteristics identified by the TWG?
  - 5) What are your suggestions or comments on this literature review procedure and methods? If changes are recommended, please explain in detail.
  - 6) Do the two questions to be applied to each topic meet the need of the TMDL to identify potential sources, both anthropogenic and natural, and link those sources to impairments of beneficial uses?
2. Examine literature and consult state and federal agency staff, university scientists, and other experts for current reviews of each literature review topic (see list of Literature Review Topics by Source/Process and Figures 1-2e, conceptual diagrams of source pathways and channel sources/processes for these TMDLs). If comprehensive reviews already exist, DEQ staff will examine the reviews and evaluate their sufficiency for that topic of the sediment literature review.
  3. If current reviews are not sufficient to characterize the natural sources and processes of a review topic *and* to examine the management-related alterations of those sources and processes, DEQ staff will conduct a literature review for that topic. The review will:
    - 1) Use the search methods described Literature Search Methodology section of this document;

- 2) Develop topic-specific inclusion criteria to determine which literature will be included in the review;
- 3) Use information taken from Results sections of included literature, and document the information used;
- 4) Identify and account for factors which modify the Results of studies (e.g. climate/weather, geology, or geographic location) and document those factors;
- 5) Summarize the relevant literature and identify remaining questions.

**TWG/State Agency role:** Provide review and comment on:

- 1) Inclusion criteria for the review topics;
- 2) Suggested additions to keywords to be used for searching databases;
- 3) Any suggested literature that may be relevant to the review.

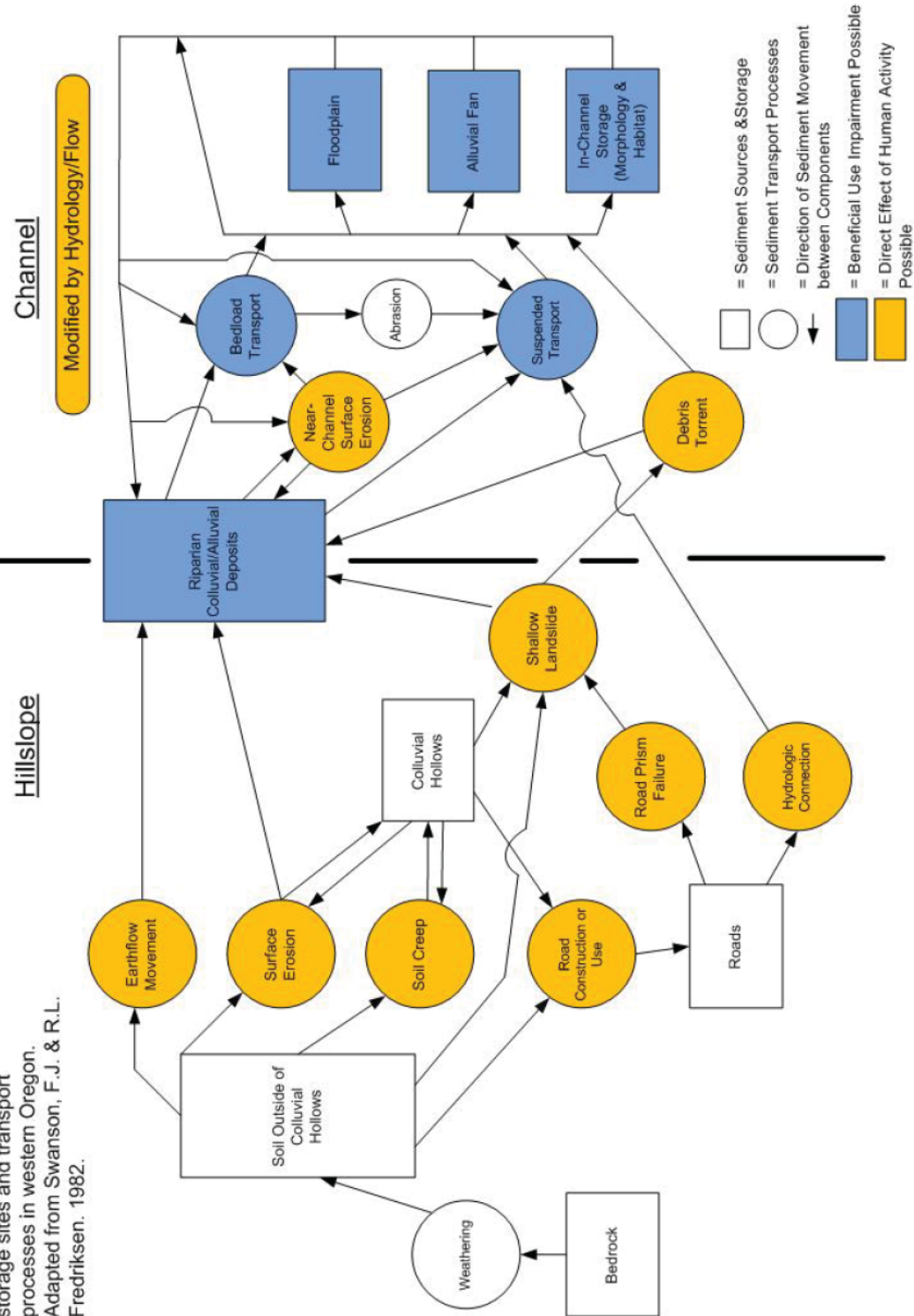
4. Submit topics' literature reviews to outside experts, state and federal agencies, and TWG members for review and comment (DEQ would present results of review to TWG at meetings by topic).

**TWG/State Agency role:** Provide review and comment on each topic's literature review.

5. After completion of literature review process, DEQ will use the information from the literature review in the Source Assessment and Linkage Analysis of the TMDL. DEQ will determine if the information is also useful in other TMDL sections.

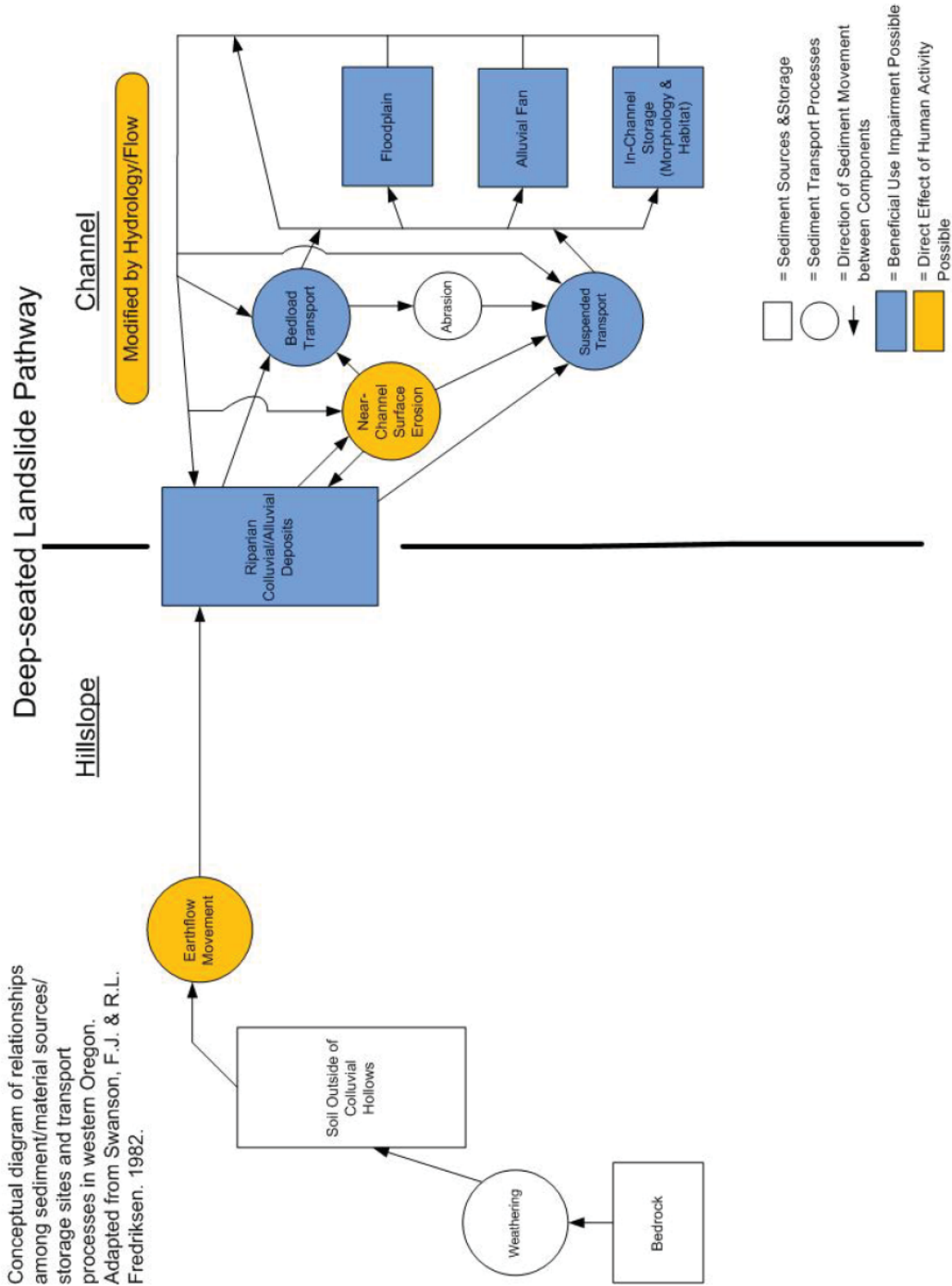
**Figure 1**  
Sediment and Material Storage & Movement

Conceptual diagram of relationships among sediment/material sources/ storage sites and transport processes in western Oregon. Adapted from Swanson, F.J. & R.L. Fredriksen, 1982.



Swanson, F. J. & R.L. Fredriksen, 1982. Sediment routing and budgets: Implications for judging impacts of forestry practices, pp 129-137. In: Swanson et al (ed.) Sediment budgets and routing in forested drainage basins. US Forest Service GTR-PNW-141.

**Figure 2a**



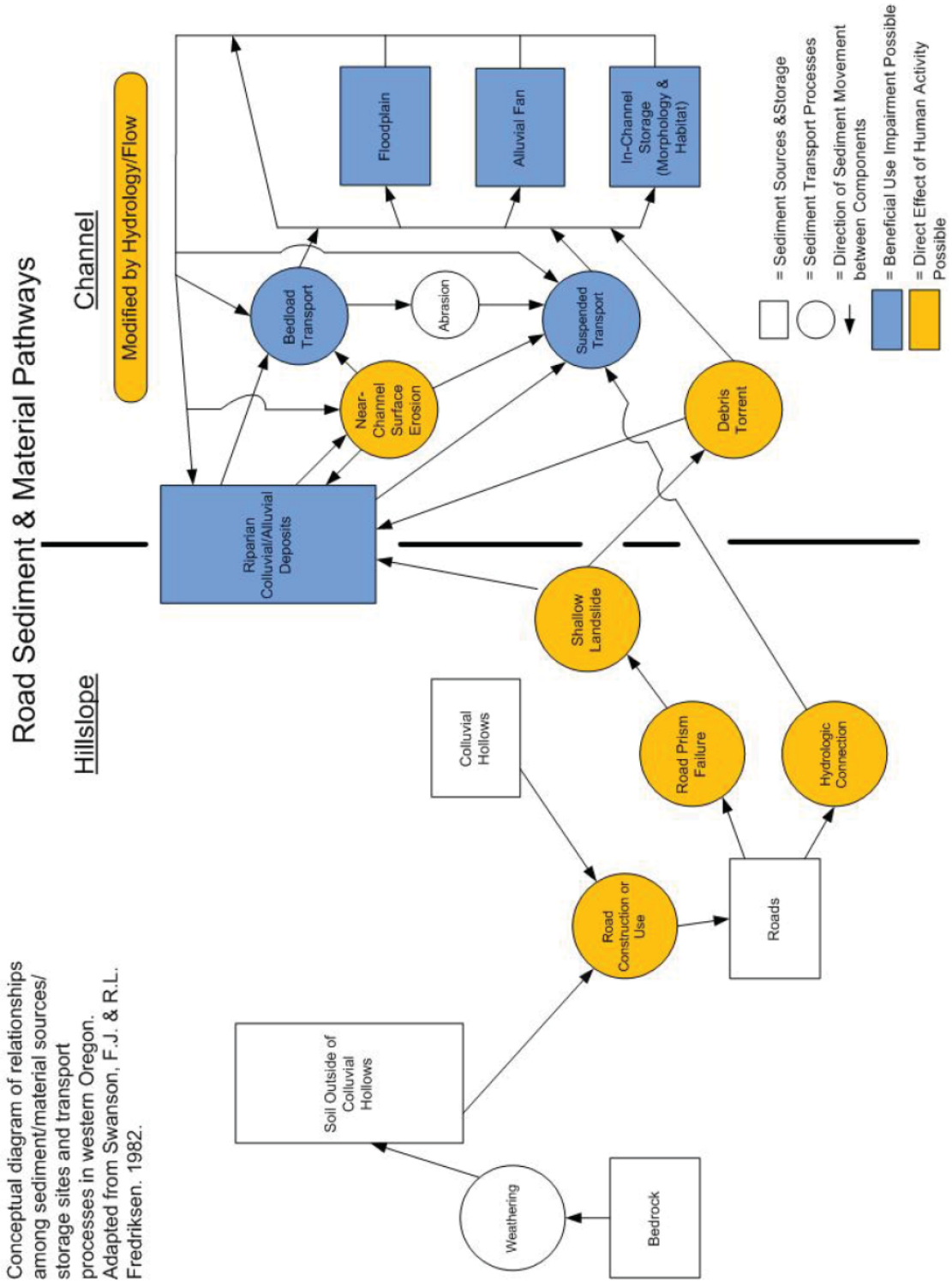
Conceptual diagram of relationships among sediment/material sources/storage sites and transport processes in western Oregon. Adapted from Swanson, F.J. & R.L. Fredriksen, 1982.

Swanson, F.J. & R.L. Fredriksen, 1982. Sediment routing and budgets: Implications for judging impacts of forestry practices, pp 129-137. In: Swanson et al (ed.) Sediment budgets and routing in forested drainage basins. US Forest Service GTR-PNW-141.



**Figure 2b**

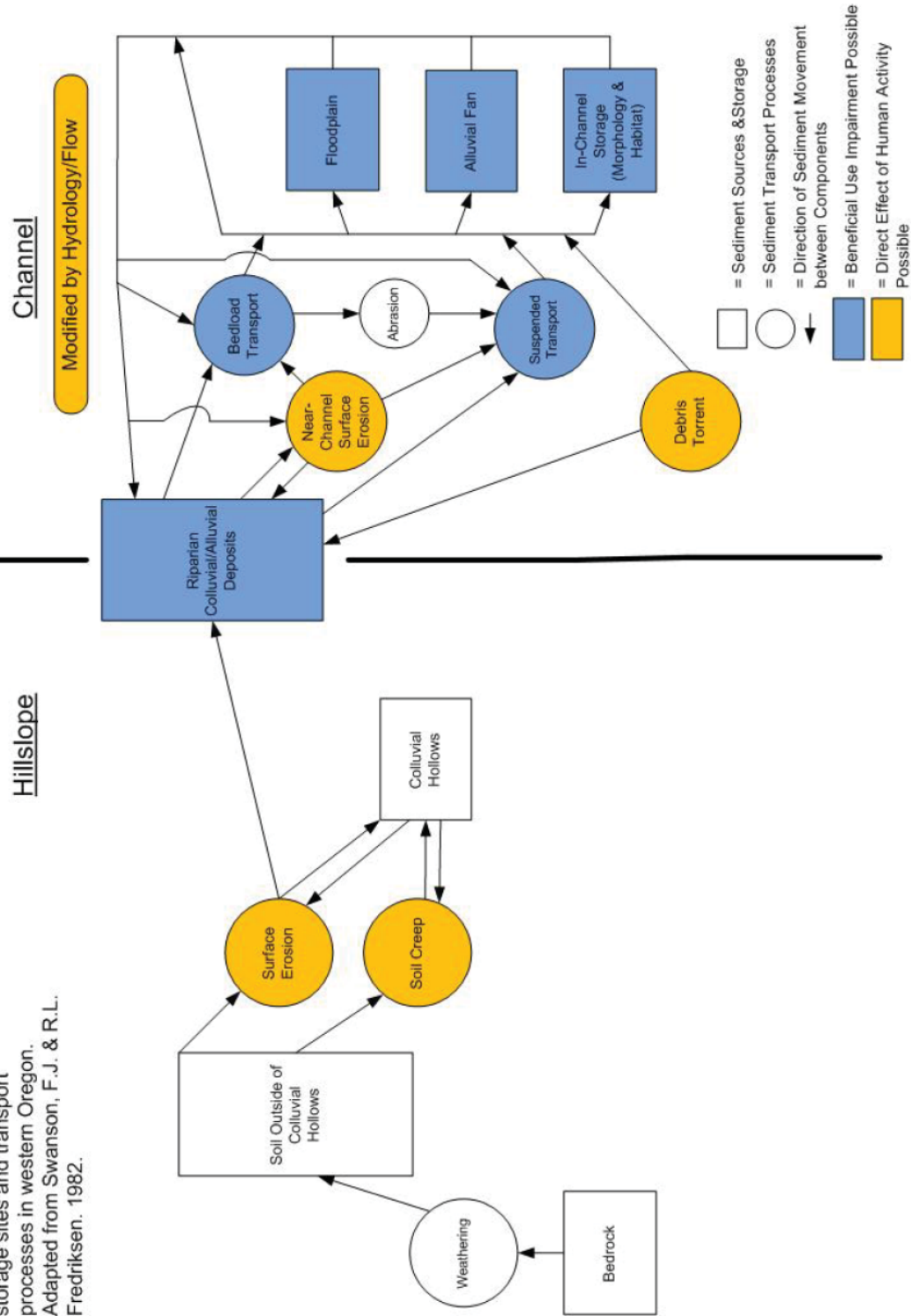
Conceptual diagram of relationships among sediment/material sources/storage sites and transport processes in western Oregon. Adapted from Swanson, F.J. & R.L. Fredriksen, 1982.



Swanson, F. J. & R. L. Fredriksen, 1982. Sediment routing and budgets: Implications for judging impacts of forestry practices, pp 129-137. In: Swanson et al (ed.) Sediment budgets and routing in forested drainage basins. US Forest Service GTR-PNW-141.

**Figure 2c**  
Surface Erosion Sediment & Material Pathway

Conceptual diagram of relationships among sediment/material sources/storage sites and transport processes in western Oregon. Adapted from Swanson, F.J. & R.L. Fredriksen, 1982.



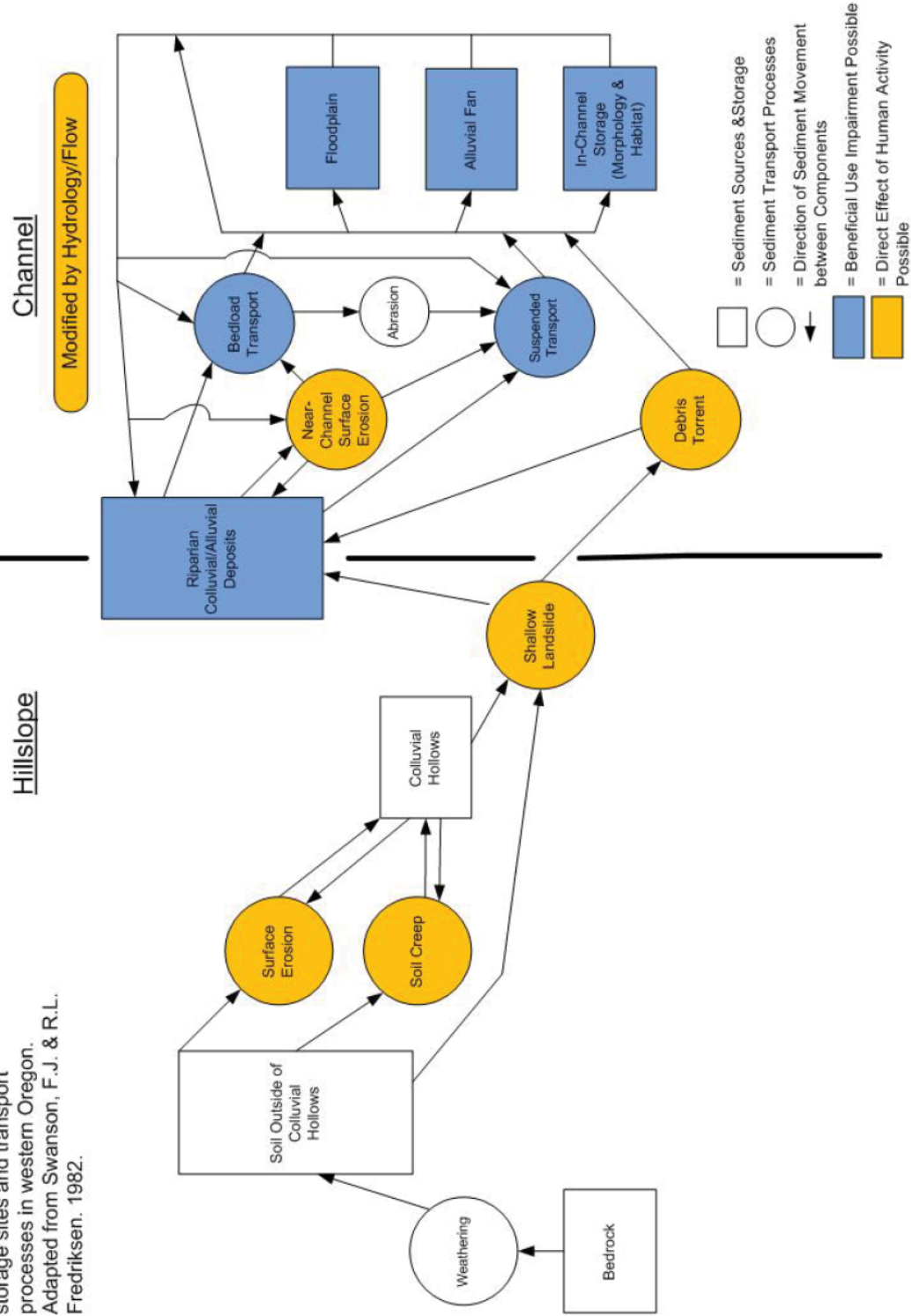
Swanson, F. J. & R.L. Fredriksen, 1982. Sediment routing and budgets: Implications for judging impacts of forestry practices, pp 129-137. In: Swanson et al (ed.) Sediment budgets and routing in forested drainage basins. US Forest Service GTR-PNW-141.



**Figure 2d**

Conceptual diagram of relationships among sediment/material sources/storage sites and transport processes in western Oregon. Adapted from Swanson, F.J. & R.L. Fredriksen, 1982.

## Shallow Landslide Sediment & Material Pathway

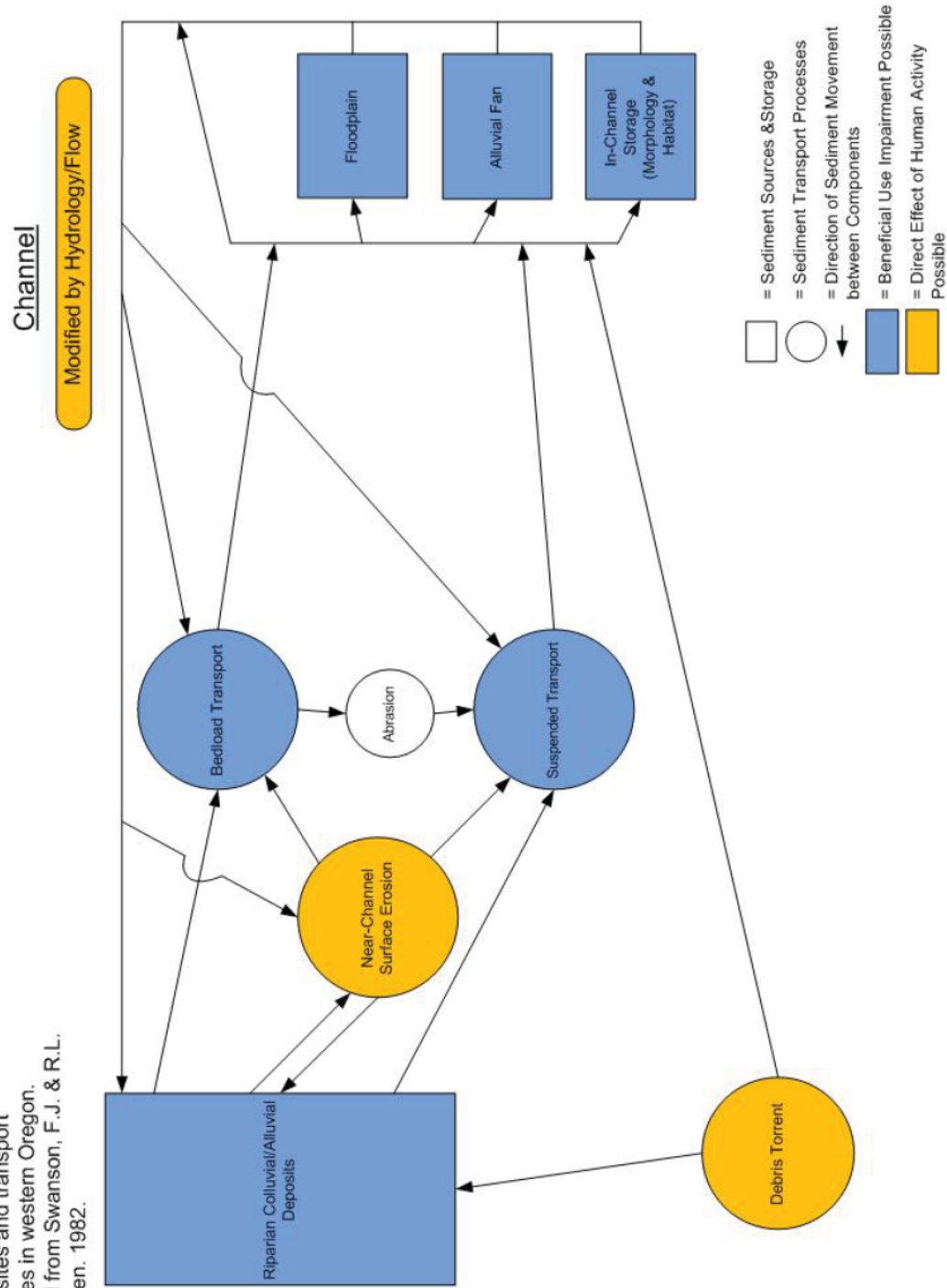


Swanson, F.J. & R.L. Fredriksen, 1982. Sediment routing and budgets: Implications for judging impacts of forestry practices, pp 129-137. In: Swanson et al (ed.) Sediment budgets and routing in forested drainage basins. US Forest Service GTR-PNW-141.

**Figure 2e**

# Channel Sediment and Material Processes & Storage

Conceptual diagram of relationships among sediment/material sources/storage sites and transport processes in western Oregon. Adapted from Swanson, F.J. & R.L. Fredriksen, 1982.



Swanson, F. J. & R.L. Fredriksen, 1982. Sediment routing and budgets: Implications for judging impacts of forestry practices, pp 129-137. In: Swanson et al (ed.) Sediment budgets and routing in forested drainage basins. US Forest Service GTR-PNW-141.

### Literature Search Methodology

The literature review will make use of:

- Peer-reviewed journal articles, published or *in press*;
- Government reports (officially released); and
- Master's and doctoral theses (accepted).

### Geographic Extent for Acceptable Literature

Oregon, Washington, and British Columbia west of the crest of the Cascades; the Siskiyou Mountains and coastal ranges of northern California; northwest British Columbia; southeast Alaska.

The literature search for each topic will use an *ad hoc* search methodology to make doing reviews for seven topics possible. In the *ad hoc* search:

- Literature previously examined by DEQ, ODF, ODA, ODFW, DOGAMI, EPA, NOAA–Fisheries, and other state, local, and/or federal agencies will be tested against the inclusion criteria;
- Bibliographies and citation searches of included primary papers and reviews will be examined for relevant references;
- Email or phone queries concerning relevant studies will be sent to scientists and stakeholders (e.g., federal agencies, participating environmental NGOs, scientists in universities and industries) in the Pacific Northwest who study or would be aware of publications concerning sediment regimes, aquatic ecology, and water quality in drinking water sources;
- Members of the MidCoast Sediment Technical Working Group will be consulted for relevant studies of which they may be aware.
- Database searches using keywords will be done for relevant studies in the Pacific Northwest.

Searches will also be carried out within the web pages of relevant associations and organizations including, but not limited to:

- the US Environmental Protection Agency;
- Oregon Dept. of Forestry;
- Oregon Dept. of Agriculture;
- Oregon Dept. of Fish and Wildlife;
- Oregon Dept. of Geology and Mineral Industries;
- Oregon's Independent Multidisciplinary Science Team;
- National Council for Air and Stream Improvement;
- Washington Dept. of Natural Resources/Cooperative Monitoring, Evaluation and Research Committee;
- Washington Dept. of Ecology/ Forest Practice Effectiveness Monitoring Program;
- Washington Dept. of Agriculture;
- California Dept. of Forestry and Fire Protection;
- California Dept. of Food and Agriculture;
- British Columbia Ministry of Forests, Lands, and Natural Resource Operations;
- US Forest Service;
- US Bureau of Land Management;
- Northwest Indian Fisheries Commission;
- Columbia River Inter-Tribal Fisheries Commission;
- Skagit River System Cooperative;
- Canadian Forest Service, Natural Resources Canada;
- Alaska Dept. of Natural Resources/Divisions of Forestry and Agriculture

- Alaska Dept. of Environmental Conservation.

Finally, to capture theses and dissertations that are archived more recently (i.e., not located in regular library catalogs), the search will include catalogues of electronic graduate theses from research universities in the Pacific Northwest:

- Oregon State University;
- University of Oregon;
- Portland State University;
- University of California system;
- University of Alaska;
- University of Washington;
- Washington State University;
- University of British Columbia;
- Simon Fraser University.

The following databases will be searched:

- Scopus
- World Cat
- CAB Abstracts
- Tree Search: USDA Forest Service Research
- AGRICOLA: Ebsco
- Streamnet Library Columbia Basin
- WAVES Canada: Libraries of Fisheries and Oceans Canada

For every search, the following information will be documented:

- Date when search was conducted
- Database, search engines, websites, or professional network that was searched
- Exact search strings used



The diagram illustrates the evolution of a river valley through four stages of erosion, labeled 1 through 4. The main 3D view shows a mountainous landscape with a landslide headscarp at the top. Stage 1 shows initial erosion with a steep slope. Stage 2 shows a more defined valley floor. Stage 3 shows a wider valley floor. Stage 4 shows a broad, flat valley floor with a fan, bar, and strath. A cross-section graph at the bottom left plots Elevation against Distance downvalley, showing a steep initial slope that flattens out, with a note "slope > 0.03-0.10" for the final stage.

JD Stock & WE Dietrich. 2006. Erosion of steep-land valleys by debris flows. *GSA Bulletin* 118: 1125-1148.



Figure 4

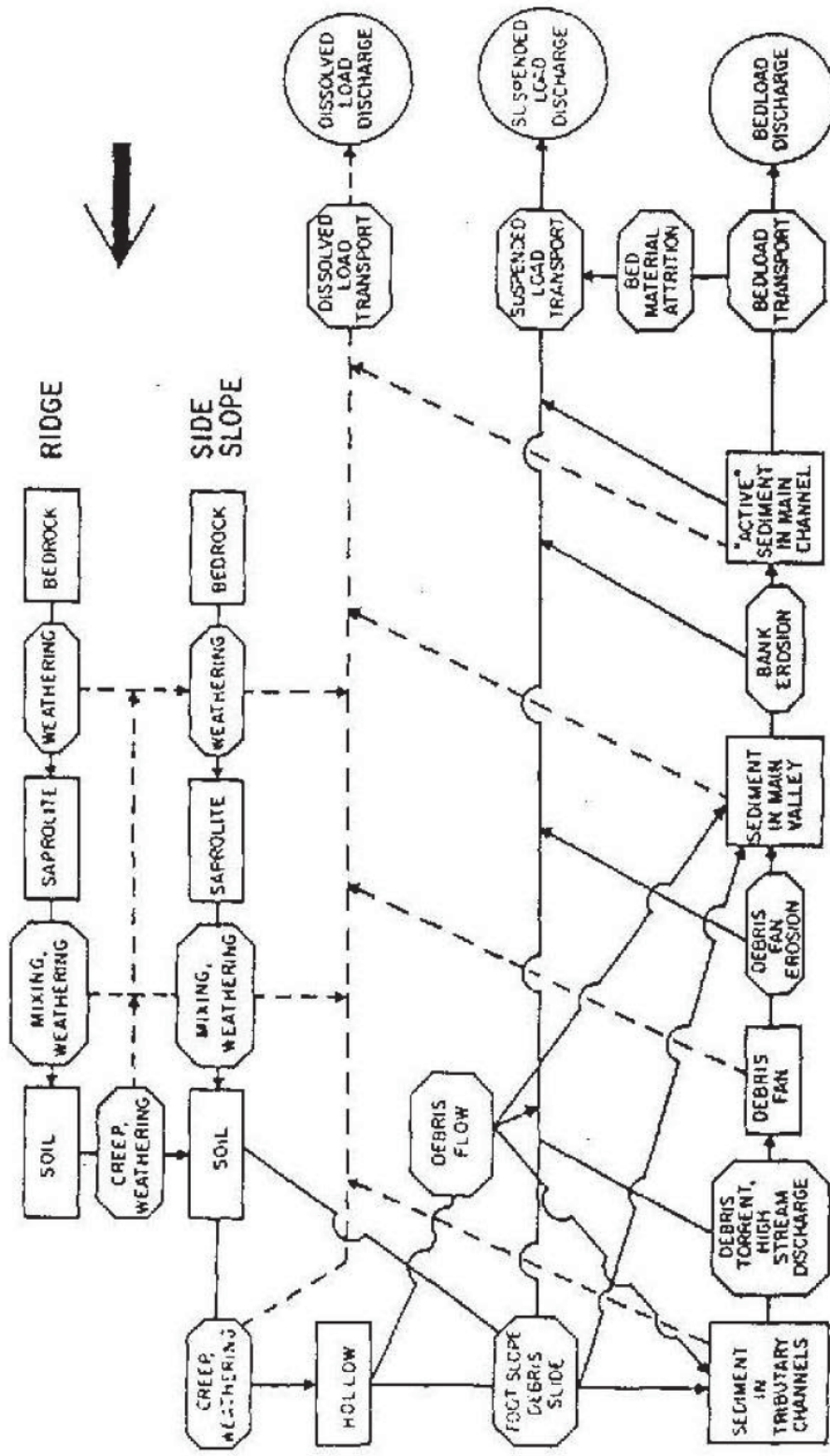
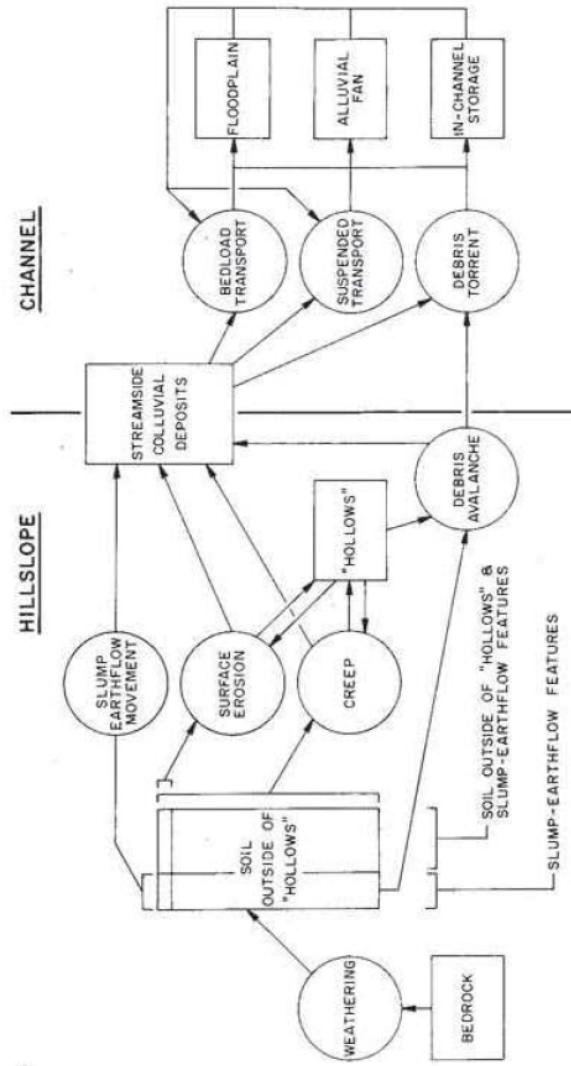


Fig. 6. Sediment budget model for the Rock Creek basin. Rectangles represent storage systems. Octagons indicate transfer processes. Circles represent outputs. Solid lines represent the transfer of sediment and dotted lines represent the migration of solutes.

WE Dietrich & T Dunne. 1978. Sediment budget for a small catchment in mountainous terrain. *Z. Geomorph. N. F.* 29: 191-206.

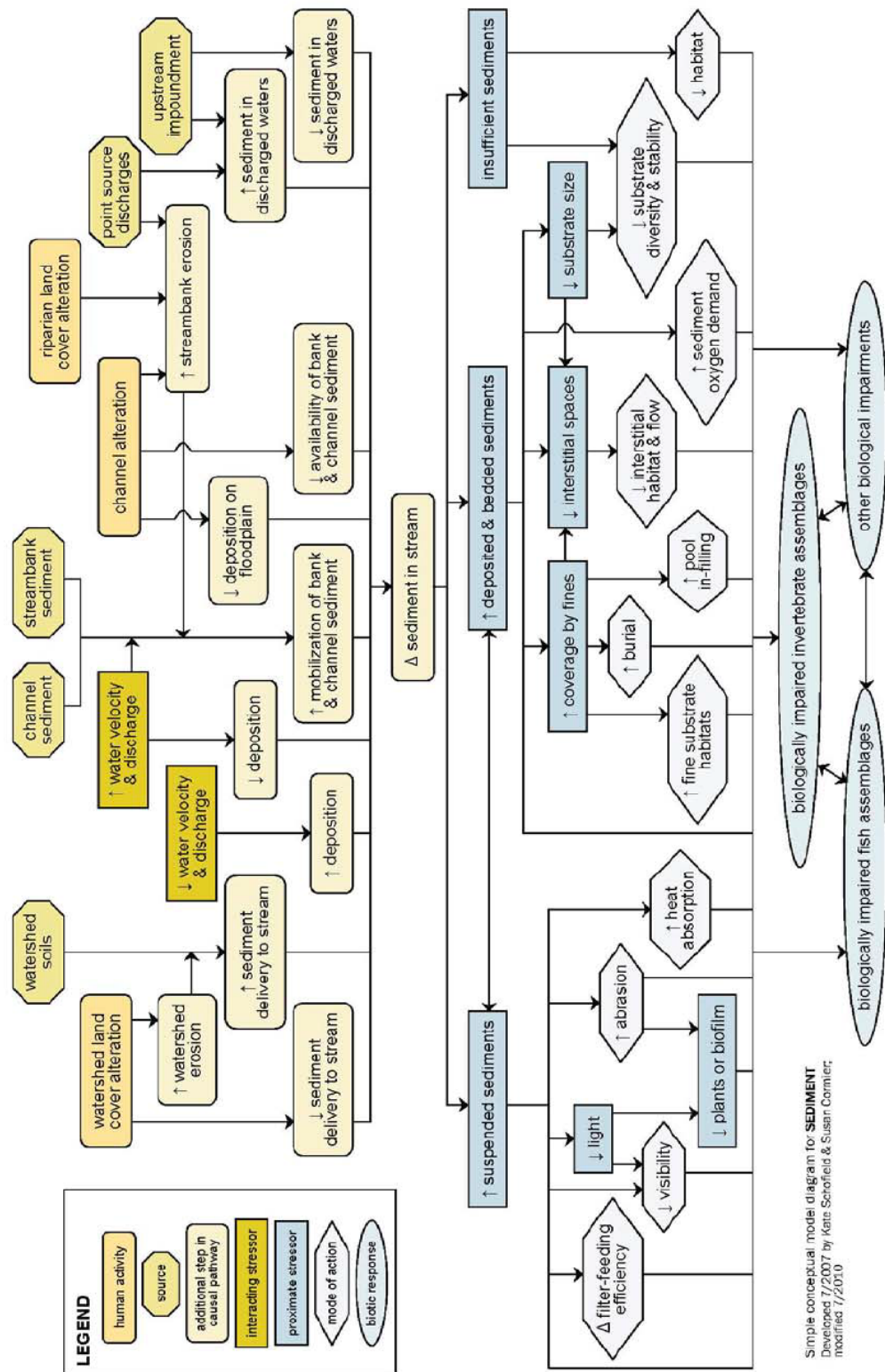
**Figure 5**

Figure 1—Simplified flow chart of relationships among storage sites (boxes) and transport processes in steep, volcanic terrane in the western Cascades, Oregon.



Swanson et al. 1982. Sediment budgets and routing in forested drainage basins. US Forest Service GTR-PNW-141.

Figure 6



EPA Sediment Conceptual Model, Simple Version.



## Mid-Coast Basin Sediment Technical Working Group Draft Literature Review Procedure & Conceptual Models Response to Comments

Oregon Department of Environmental Quality  
Water Quality Program

Contacts: Josh Seeds      503-229-5081  
David Waltz      541-687-7345

### Conceptual Model Channel Comments

- 1) **Comment:** (Wayne Hoffman, MidCoast Watersheds Council) "Include arrows directly from Earthflow Movement and Surface Erosion to Suspended Transport [rather than only through Riparian Deposits]."

**Response:** It is true that sediment/material from earthflows and surface erosion can move directly through a riparian area and into streams, rather than residing for a time in the riparian area. However, this direct transport through the riparian area could be thought of as a very short residence time in Riparian Deposits storage and may be indicative of a lack of proper riparian function, a subject to be examined in the literature review. To keep the Conceptual Model more legible, those arrows will not be added, but it is noted that it is important to account for the fact that surface and earthflow erosion can travel quickly through riparian areas.

- 2) **Comment:** (Paul Measeles) "Rename "Zero-Order Swales" to "Colluvial Hollows"."

**Response:** This terminology change has been used for the revised Conceptual Model.

- 3) **Comment:** (Several TWG members) "Add process circle for Sheet Erosion/Rilling alongside Bedload Transport, Suspended Transport, and Debris Torrent circles."

**Response:** A Near-Channel Surface Erosion process circle has been added to the Channel side of the Conceptual Diagram in addition to the Surface Erosion process circle on the hillslope side. This will account for surface erosion in riparian areas and floodplains, better accounting for the effects of natural disturbances, forestry, agriculture, transportation, and development in these locations. This circle will be colored gold, as this process can be affected by human activity.

- 4) **Comment:** (Peter Leinenbach, EPA) "I have a simple comment about Figure 1 – I would propose that the Debris Torrent bubble should be colored blue – meaning that Beneficial Use Impairment Possible through the destruction of habitat. I sure you have seen this many times in the field – For example, as part of the lower Puget Sound Sentinel Site Monitoring here in Washington, there was a river site which had a huge destructive debris torrent resulting from a beaver dam breakage blocking up a culvert under a road bridge leading to the entire stream to scoured out downstream of the event. The stream is slowly recovering over the past 5 years but the habitat is basically hosed and a lot less fish use the habitat. I would say that this DT event resulting from the road culvert failure impacted the BU."

**Response:** This and other effects of debris torrents would be captured in the examination of processes that affect the In-Channel Storage (Morphology & Habitat) box in the Conceptual Diagram. The blue coloration is meant to show that this source/sink (boxes) or process (circles) directly effects beneficial uses (e.g. suspended sediment scouring macroinvertebrates from the streambed or insufficient large wood and channel complexity limiting available salmonid rearing habitat). However, we will make sure that debris torrent effects on habitat are included in the review. To make clear that debris torrent behavior can be affected by human activities (similarly to shallow landslides), the Debris Torrent circle will be colored gold.

- 5) **Comment:** (Mike Buren, ODF) “There seems to be a lack of agricultural sources/pathways/processes in the diagram so here are some comments relating to that. For the most part ag occurs in what is/was the floodplain and riparian areas so I think most of ag should be integrated in the “channel” side of the diagram.”

**Response:** Agricultural land use in the floodplain or the riparian areas would be captured in the Channel side of the Conceptual Diagram, as would any other land uses (forestry, residential) occurring in those locations. Upland agricultural uses are also possible and would be captured in the Surface Erosion process.

- 6) **Comment:** (Mike Buren, ODF) “I would put “natural” as a modifier to the square called “floodplain”.”

**Response:** Modification of floodplains for land use has important effects. However, all source/sink types (boxes) on the Channel side can be modified by human activities. This will be accounted for in the assessment of anthropogenic effects during the review.

- 7) **Comment:** (Mike Buren, ODF) “Add a square next to floodplain called “managed ag lands”.”

**Response:** Managed agricultural lands occur in low-gradient upslope areas, riparian areas, floodplains, and alluvial fans. Anthropogenic effects of all land uses will be considered, using available information, in all of these locations. There is no need to call out agricultural lands specifically without also calling out managed forest lands and high-density/low-density developed lands. The Conceptual Diagram deals with landscape features rather than land uses. Areas in particular land uses are contained within the source/sink boxes (e.g. Colluvial Hollows, Riparian Deposits, or Floodplains) and processes (e.g. Surface Erosion or Earthflow Movement); for example, review of Surface Erosion and Soil Creep processes would look at both the natural processes and how human activities such as land clearing, grazing, and forest harvest affect those processes.

- 8) **Comment:** (Mike Buren, ODF) “Add a circle called “sheet flow” that the new ag lands box is connected to which is of course connected to the three blue shapes on the channel side of the diagram.”

**Response:** A new process for Near-Channel Surface Erosion has been added. See response to Comment #3 above.

- 9) **Comment:** (Mike Buren, ODF) “Add a yellow circle called “plowing and clearing” also on the channel side which is connected to the new “sheet flow” circle.”



**Response:** This is a type of management that can affect erosion. With the exception of road building and maintenance, no other land use activity is directly called out in the Diagram. If the Diagram were to include specific management activities as processes, it would be necessary to add many more activities: grazing, construction, forest harvest (felling and yarding), reforestation operations, habitat restoration activities, etc. That is not the purpose of this diagram, and would make it illegible. Effects of all land uses on sources and processes will be accounted for in the review, as best as possible with available information.

- 10) **Comment:** (Mike Buren, ODF) “Add a yellow circle called “livestock disturbance” also connected to the three blue shapes on this side of the diagram”.

**Response:** See response to Comment #9.

- 11) **Comment:** (Terry Frueh, ODF) “The roads box, and 2 associated circles, and debris torrents circle should all have orange color to indicate direct effect of humans (similar story for following figures).”

**Response:** The three process circles have been colored gold to reflect that a direct effect of human activity is possible.

#### Conceptual Model Channel Comments

- 12) **Comment:** (Mike Buren, ODF) “Weathering also occurs in “zero order swales”.”

**Response:** Zero-Order Swales (now called Colluvial Hollows) can have rock that weathers into new mineral soil. This could be captured in the Diagram, but weathering of bedrock to mineral soil is not a major focus of this review.

- 13) **Comment:** (Mike Buren, ODF) “The “roads” box can also be a proxy for quarries, landings, waste sites.”

**Response:** Quarries for road material (“borrow pits”), landings, and end-haul disposal sites can indeed be treated as part of the road network.

- 14) **Comment:** (Mike Buren, ODF) “For the earthflow movement yellow circle. That can be affected by large fills (aggregate stockpiles, waste piles, large road fills) so perhaps there should be a circle called “loading by large fills” pointing to earth flows.”

**Response:** These activities can be considered when evaluating anthropogenic effects on earthflows.

- 15) **Comment:** (Terry Frueh, ODF) “Also, you may want to consider abrasion since e.g., Tyee sandstone breaks down so quickly (i.e., what starts as bedload becomes suspended load within a few kilometers as it gets abraded).”

**Response:** An abrasion process has been added between Bedload Transport and Suspended Transport to account for this.

- 16) **Comment:** (Terry Frueh, ODF) “Niggly detail probably not important, but thought I’d mention it: sometimes suspended load is divided into “wash” load (i.e., clay that doesn’t settle quickly), and

“suspended bed material” (e.g., sand that moves in suspension but settles quickly enough to form part of streambed).”

**Response:** It will likely be important in the review to distinguish between the effects of different suspended grain sizes on aquatic life and fluvial geomorphology.

## Procedure Comments

17) **Comment:** (Peter Leinenbach, EPA) “I also have another simple question about the “variability” of the research. Do you have an ability (or a defined process) to not necessarily take the results section at face value (i.e., you state that you will “Use information taken from Results sections of included literature, and document the information used”). That is, it is possible that some sources of literature on this topic will have unsupported and/or weakly documented results which are used to reach some grand conclusion which only supports a preconceived conclusion (This might be found if you look closely enough). Often these types of findings are contrarian to results from most other research on the topic. Do you include these documents? Also, do you give these outliers 50% of the consideration, despite that only one or maybe two papers (out of hundreds) find a particular result?”

**Response:** Comment #21 below raises a similar issue to the first point: How will quality and relevance of studies be determined? Well-written inclusion criteria will help ensure only relevant studies are included. During the review, DEQ will need to evaluate quality and relevance by looking at the Methods in the papers and making direct note of issues such as small sample sizes in highly variable systems. Any assessment of quality will be documented. DEQ will be looking at what factors may contribute to differing results among studies. For example, did two studies have contrary results that could be explained by outside factors such as geology or the timing of major storm events? By using the Results sections, documenting the information used and modifying factors, and documenting what was directly tested or observed, DEQ will be better able to separate “grand conclusions” in the Discussion from the actual direct evidence.

Any documents that meet the inclusion criteria and are within the correct geographic area will be included. If a study gives a result contrary to most other studies on a topic, then reviewers would first look at any modifying factors (such as differences in geology or precipitation) that may explain the differences. In some cases, study quality may also be used to weight the consideration which a particular paper’s results receive (e.g. a finding of “no effect” when small samples sizes have little power to detect differences). Generally, a weight-of evidence approach will be used when papers have differing or apparently contradictory results.

18) **Comment:** (Mike Buren, ODF) “There is no ag here. Did we decide to ignore it early on in our other meetings? I can’t remember, but if not then under the “channel sources and processes section” you can add the items/process above that I mentioned for fig 1.”

**Response:** All land uses will be considered, when present. Nowhere in the Procedure is there language that removes any land uses from consideration.

19) **Comment:** (Mike Buren, ODF) “During the first big storm of the year (end of Sept) I was out wandering around looking at streams. I was on the Tillamook state forest and drove up the valley from west salem to forest grove. What I noticed was a total overwhelming of sediment and

turbidity to waterways by ag lands which were newly plowed (powdered), by the first storm. Each ditch and lowland stream was nuked from direct runoff of ag lands.

“As I went into the forest Gales creek was partly cloudy as it entered the ag areas and gradually cleared up as I went up hill. There was no one location which I could see an obvious increase. The worst of it was not even close to looking like the drainage coming off of ag. Same observations held true for the Wilson River. There were two unusual sources I noticed off of forestland. One was Ben Smith Creek where we have a chronic problem from a deep seated slide (natural caused) and one was from a small N [stream] in the same area which was due to a creekside slough in forestland which hadn’t been cut for 40 years (natural caused).

So my point is WE NEED TO TAKE A CLOSER LOOK AT AG LANDS!”

**Response:** The Source Assessment, including the Literature Review, is examining sediment loads from agriculture.

- 20) **Comment:** (Terry Frueh, ODF) [Re:Identifying where State Agency/TWG input points are in the Procedure] I find it helpful how you identify this throughout the document. It’s good to see where and how in the process TWG/agencies will have input.

**Response:** Thank you for the feedback that this is helpful.

- 21) **Comment:** (Terry Frueh, ODF) [Re: Submit topics’ literature reviews to outside experts, state and federal agencies, and TWG members for review and comment (DEQ would present results of review to TWG at meetings by topic).] “If I think about this document through the lens of SR, there is nothing re: assessing study quality/ relevance, how info will be rigorously extracted from studies, how the synthesis will be completed, nor exactly what will be documented in the overall review process. Having said that, I recognize that: 1) outlining all of that at this stage may be impossible; and, 2) Doing this level of rigor and documentation for the entire project may be too much for DEQ to accomplish in a reasonable timeframe.”

**Response:** See response to Comment #17 above. This review will be as rigorous as time and resources allow.

- 22) **Comment:** (Terry Frueh, ODF) [Re: Literature types] “Do you want to include articles in prep or in review?”

**Response:** Peer-reviewed articles that are published or *in press* will be used, in addition to final government reports and accepted theses/dissertations. Articles which are *in prep* or *in review* will not be used, as they are subject to change or additional analysis prior to publication.

- 23) **Comment:** (Terry Frueh, ODF) [Re: Geographic Extent] “You may want to add a little specificity here: we included only the coast ranges of N. CA since the cascades in CA go to Lassen, and these are fairly dry....”

**Response:** The Procedure has been changed to reflect this distinction and be more specific.

24) **Comment:** (Jeff Light, Plum Creek Timber) “As for your sediment literature review, your general approach seems solid. I base this on your presentation, not on the write-up you provided at the last TWG meeting.”

**Response:** Thank you for the feedback.